

correctly. The study of nature has both an intellectual and a scientific aspect. From the latter point of view one records new or special phenomena, and may hope to discover new laws of nature, but from an intellectual point of view the study becomes a means of increasing one's knowledge and disciplining one's reason and senses; from this point of view, every one, old and young, must derive benefit from the study.

BACK NUMBERS OF THE MONTHLY WEATHER REVIEW.

Mr. Barry C. Hawkins, Voluntary Observer, Horse Cove Station, N. C. (post office address, Highlands, Macon Co., N. C.) desires to exchange back numbers of the MONTHLY WEATHER REVIEW for the following publications:

Weather Bureau Bulletin No. 11, Parts 1 and 2.

Signal Service Notes No. 9. "Weather Proverbs."

Greely, "Report on the Climatology of the Arid Region."

Greely, Report on the Lady Franklin Bay Expedition.

METEOROLOGICAL OBSERVATIONS AT PUBLIC SCHOOLS.

The following is an excellent presentation of this subject by Mr. H. E. Wilkinson, Local Forecast Official and Section Director, Vicksburg, Miss., and is reprinted from the December report of the Mississippi Climate and Crop section. Ideas similar to those of Mr. Wilkinson have indeed been advocated by others in other places, but his presentation is quite well worth reading. The study of nature herself and familiarity with nature rather than with books is the leading idea of modern education, from the primary school up to the post graduate schools of the university.

In the autumn of 1881 the Editor's attention was drawn to the excellent "Nature Study" introduced into the Normal School at Washington, D. C., and thence into the lower grade public schools, by Miss Lucilla E. Smith, who subsequently removed to Brooklyn, N. Y., and introduced the same ideas into the schools of that city. The fundamental principles of nature study are now rapidly spreading throughout this country and must eventually prevail everywhere, for they are founded on correct principles and necessarily bring about successful results. A child is naturally a learner; he is an inquisitive student and experimentalist. At first he learns by bumps and bruises and through pains and troubles; frequently he actually makes experiments and observes closely and reasons and argues to himself. It is always easier for him to learn by personal experience than by reading books or listening to others tell about things as seen by them. Give him stones, woods, flowers, birds, insects, animals, clay and sand, tools and materials to handle and work with. He learns best about men and things and principles by coming into daily personal contact with them. In order to stimulate him to accuracy, he is encouraged to measure and record carefully. The weather lends itself to this method of training quite as easily as any other subject. He may learn a little meteorology, but more important is it that he learn accuracy of observation and correct logical reasoning. The set of forms for a daily record of the weather introduced into the Wash-

ington Normal School in 1881, by the present writer, was simply a suggestive leader for the children and their teachers. Both these forms and the work done were subsequently put on exhibition in the Educational Department of the Exposition at New Orleans, La., in 1884-5.

In an address before a teachers institute in California several years ago the writer urged that every school house be provided with instruments and weather observations be taken. This opinion has been strengthened by the publication recently of a circular by the Department of Agriculture entitled "A German Common School with a Garden," from which the following extracts are taken:

"In most instances this garden is used solely as a source of income and pleasure to the teacher. Occasionally, however, some specially active and wide-awake teacher sees in the garden a means of instruction. Here plants can be watched in their development from seed to flower and fruitage; the curled leaves on a choice plant may show where some insect has made its home; a heavily-laden apple tree may suggest the value of pruning; a few pansies or a rose bush rightly placed may awaken ideas of beauty. * * * Pupils working among these flowers, pruning trees, or gathering berries from vines planted and tilled by themselves, may acquire an interest in nature and husbandry which will remain with them throughout their after life."

It is for the same good of the scholar that weather observations should be taken at every school house. A wide-awake teacher with a maximum and minimum thermometer and a rain gage can soon develop such an interest in a practical way that the lessons in physical geography, instead of being dull, will become intensely interesting and the scholars will have demonstrated to them in practice what the geographies teach theoretically.

The Weather Bureau has been doing a work of education since its organization, but notwithstanding the hundreds of thousands of weather maps and other publications that are disseminated annually comparatively few people receive them. It has undertaken to cover the country with its regular stations of observation, supplemented by the cooperating voluntary observer. This in whole amounts to about 3,035 points of observation and covers not only the United States proper but points in the West Indies and bordering on the Caribbean Sea and Alaska. Deducting the West Indian service and Alaska, we have one station for about every 1,175 square miles.

Of course the larger number of observations are made in the more thickly populated parts of the country. California, as an instance, with its 158,360 square miles has 318 observing stations, or one for about every 500 square miles, while Texas with 265,780 square miles has but one station for every 2,550 square miles. It is impracticable for the general Government to so cover the country as to bring out local climatology, now much needed. The study of climatology was never so closely followed as now. Meteorology has never been connected with so many subjects as at present. The weather influences every process of life, every plant, and every animal. It is the commonest topic of conversation, the subject considered in connection with more plans than any one thing, and yet there is but one observer for every 1,175 square miles, approximately, and very few people apply the facts given each day in any practical way. It is so commonplace, in fact, as to be generally neglected.

With a class of people in our schools interested in the science of meteorology an intelligent knowledge of the movement of storms and climatology will soon attain and the great service of the Weather Bureau made of increasing value. Every section has its peculiarities of temperature and precipitation, but because of the lack of observation nothing is known of these peculiarities. The General Government makes exhaustive experiments on the growth of plants. We are told just what kind of a soil or climate is best adapted to the successful cultivation of nearly every useful plant, and the people should avail themselves of this knowledge by more completely studying the local conditions as related to temperature, precipitation, humidity, etc., and by applying one to the other.

A plan of work by which this idea might be carried into effect would at best be tentative. It must be elastic enough to admit of its adoption under many and varying conditions and yet reach the same general result. The most feasible plan is thought to be that of having the teacher responsible in person for the work, but through her the scholars perform the actual work, her participation being more in the nature of an instructor and not as an observer. There is frequently some scholar in a school who is fond of investigation, or who takes more than a passing interest in the weather. Such would make a good observer. The scholar should be taught to apply personal observation and connect present conditions with those following, as well as those past, and in this way note the rotation of storms. The blackboard in the school room affords a simple means of interesting the entire school by placing each day's observation thereon. The permanent records should be maintained in a book kept for that purpose. As the record grows daily it will become more interesting. The problem of small attendance at school on certain days, or the mental depression and consequent lack of satisfactory progress in studies and many other equally interesting problems will find solution.